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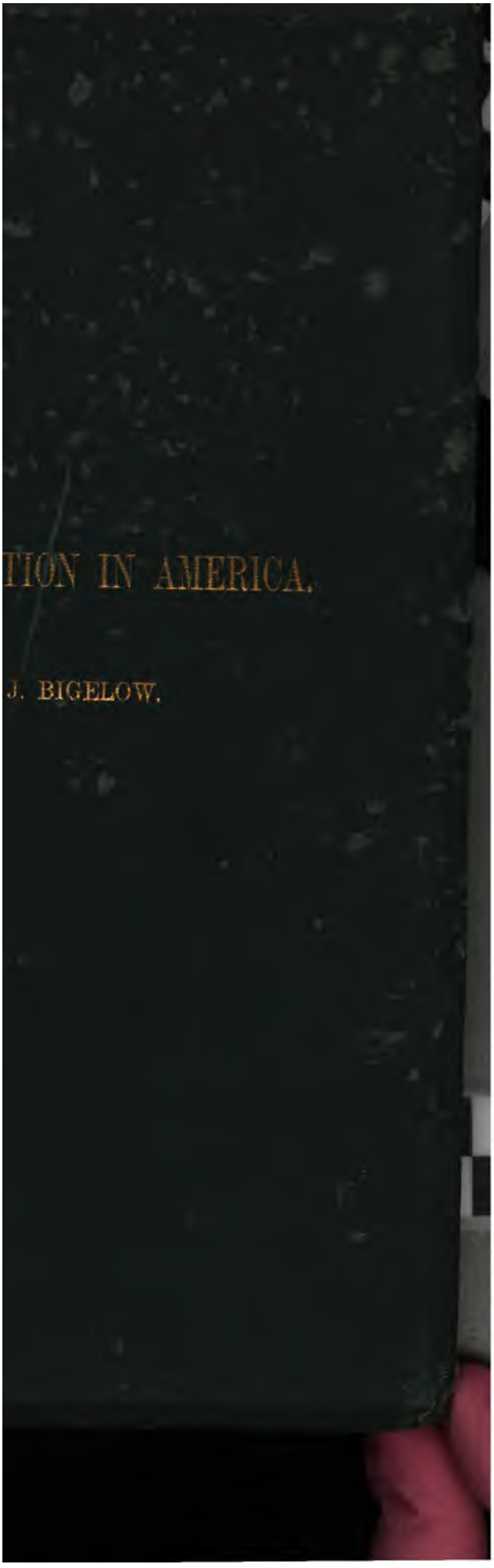
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MEDICAL EDUCATION IN AMERICA:

BEING THE

ANNUAL ADDRESS

READ BEFORE

THE MASSACHUSETTS MEDICAL SOCIETY.

JUNE 7, 1871.

BY

HENRY J. BIGELOW, M. D.,
PROFESSOR OF SURGERY IN HARVARD UNIVERSITY.

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MEDICAL EDUCATION IN AMERICA.

HAVING on former occasions said something of Medical Science and Medical Art, I propose here to offer a few practical considerations on Medical Education, with reference both to its daily use and to the progress of medical knowledge.

I am well aware that he who inculcates in general terms a high standard of knowledge, and bids God-speed to progress, has a far more grateful task, in the approval of others, and possibly of himself, than he who stops to direct or limit it by any considerations of its relative utility. But in an age of science, like the present, there is more danger that the average medical student will be drawn from what is practical, useful, and even essential, by the well-meant enthusiasm of the votaries of less applicable sciences, than that he will suffer from want of knowledge of these; and I am quite aware that I may not hope for the favorable consideration of some of my friends, when I say, that, if there is any idea which I particularly desire to present distinctly in these remarks, it is that of utility in medical education.

The zealous devotee of less serviceable science, to whom the world is indeed under obligation for

his often inadequately requited labors, whether in extending or in merely cultivating the domain of human knowledge, may well be pardoned the conviction that it is worthy of pursuit for its own sake; but he should guard against the fallacious belief that it offers quite as good an investment of time as if it had an immediate and determinate practical value, and especially against a nebulous feeling that there is a savor of earthiness in the pursuit of knowledge which is likely to be soon worth something.

The lapse of centuries has removed the amulet from the physician's sanctum, and the stuffed alligator from his ceiling. Astrology, Astronomy, and even Natural History, are known to have no immediate connection with Pathology and Therapeutics; and as the area of our science expands, we shall not only continue to eschew error, but shall leave to one side more and more of real truth pertaining less directly to it, still utilizing and incorporating its valuable results, and still finding an ample field of study beyond the compass of any one individual. If, on the other hand, it is fair to inveigh against a quackery which makes plain things difficult, buries principles beneath details, occupies the mind with mere therapeutic measures and routine, and attracts by persistent activity, I venture also to question that enthusiasm which mistakes novelty for value, and, overlooking much that is useful and practical, appropriates with eagerness what comes authenticated by recent alleged discovery, or flatters by a suggestion of exclusiveness in its pursuit.

Let us think carefully, before exacting from adult students collateral acquisitions which in practice they will not need, and actually do forget, — especially as much that is strictly medical is profitless, or nearly so, to the medical practitioner. When, in Paris, I used to hear a lecture upon the plague, or the ligature of the posterior tibial artery, I thought of my fencing-master, who was giving equally useful instruction, how, in case of attack by more than three men at once, to place your back against a tree, and, drawing a rapier, to dispose successively of each of them.

And yet there is a limit to this line of argument. No student or artisan is the worse for an outlook upon kindred arts and sciences which will help him to establish the true relations of his own, which will supply him with additional facilities and light for its pursuit, and with that training of his intellectual powers afforded by a systematic variation in their exercise. Let us concede, then, a certain latitude to the study of medical science, testing it rigidly and constantly by its applicability to subsequent medical pursuits, and especially by a frequent consideration of the question, how far it occupies the student's limited time, to the exclusion of what, to him, is more important.

Two classes of the profession at once claim our consideration: those who are to do the daily work of medical attendance only, and those who may be expected to contribute something to the development of medical knowledge, — for each of whom a course

of education is to be provided, such as will not rise above the proper requirements of the one nor fall below the just expectations of the other; or we may rather, with more economy, aim to devise a single system suited to the education of a body of students as routine practitioners and something more.

It is plain that the mass of work must be performed by the exclusive practitioner, who has been educated with the view of turning his acquirements to immediate practical account, and whose business so occupies him that he contributes comparatively little to the absolute advance of knowledge. Let us consider just what the community should expect of this man.

It has often occurred to me, that, if steam power should be substituted on common roads for horse power, collisions would be of hourly occurrence. It is as often the beast as the driver that turns out. I hold, that, as a rule, outside of surgery and other surface work, it is the disease that turns for better or for worse, and not the physician that turns it. Disease often advances with a dignity of progress not to be sensibly swayed to one side or the other by the interference of the physician. The balance of healthy function is disturbed; for a varying time the disturbance increases, and for another varying time it diminishes, until the balance is restored. A discourse which first arrested public attention here to the fact that it is useless to try to cut short cer-

tain disease, justly called it self-limited, because, if not limited by its own inherent tendencies, it assuredly is limited by nothing else.

But let us not forget, that, when we are able to limit the duration of disease, as we can that of fever-and-ague, or, more completely, syphilis, then it will be no longer, as now, self-limited, but subjugated and controlled, — and that this may be the future of any disease, not excepting tubercle and malignant affection, the failure and the exuberance of vitality, and even of old age itself, provided only the chemist will manufacture, as he of late promises to do, the vital spark. So that, if a large majority of fevers, epidemics, the more serious derangements of viscera, whether of structure or function, are as yet little controlled by anything which the physician prescribes, we are neither to doubt of future progress nor to lose sight of accomplished results, of all that can now be done to arrest disease or to alleviate it.

An accurate and well-defined knowledge of undisputed therapeutic principles and details should be exacted from every practitioner claiming to be properly qualified. He should know how to treat, and of course how to identify, all common injuries and diseases, so that health shall be reëstablished in the shortest time, whether by interference or by a resolute refusal to interfere. And you are to provide fifty such plain and competent men for one who knows more.

Look at the reverse of the picture, — at a practi-

tioner deficient in respect to the quantity or the quality of his education, — accomplished in the right direction, it may be, but also learned in the wrong, — who tells a patient he is bilious, and refers every pain in the side to the liver, — who cures rheumatism with colchicum, and scarlet fever with belladonna, and, when a straw may break her back, handicaps Nature with a six-drug prescription, — who treats cancer of the lip with ointment, till a gland swells and the patient is lost, paints every lame knee with iodine, cauterizes every inflamed throat, and cannot set a broken elbow: an industrious, driving, and perhaps thriving, but professionally incompetent man, — incompetent, not because ignorant of the labyrinths of modern Chemistry and Physiology, but because he does not know the plain rule of thumb practice in modern medicine and surgery, — because he yet lingers in the paths of exploded error, or turns like a weathercock to the last advertisement of the apothecary or journalist. Such a practitioner you do not want.

Whatever else it may or may not do, a medical school should aim first, then, to give a plain, sound, solid education, without error, if without ornament.

For, in the first place, you cannot do better than this. It is the highest average development of which the mass of the material you are dealing with is susceptible, in view of the character of its preliminary education and of the accepted three years' term of study.

In the next place, you need not do better. If you can supply the country at large with medical men thoroughly competent in all common medical matters, able first to identify and then to treat properly the local diseases and lesions, thoroughly imbued at once with the simple and broad principles of necessary therapeutic interference and with its detailed routine, and free especially from the entangled mass of therapeutic prejudice, error, and deception bequeathed by earlier art, you have raised up a class of students superior to those now graduating from any medical college in the land, and have sown seed from which individual ability and individual industry will develop a growth far beyond the average of the present day.

But there is another consideration. The excellence of the practitioner depends far more upon good judgment than great learning. Other things being equal, the best practitioner is the man of soundest judgment. With good judgment, added to industry and fair ability, you can make an excellent practitioner out of moderate medical acquirement, provided only it be of the right sort. But without good judgment, for which education is not a substitute, if you fill the mind of the student with Chemistry and Physiology and Drugs, as leading ideas, the chances are that he will apply this collateral, imperfectly applicable knowledge wrongly, and that he will have to forget and disuse much of it before he gets it down to a medical working level.

If any one who hears me will consider to whom

among his acquaintance he would prefer to intrust himself in such common cases as make up the mass of medical practice, if assured of a kindness and business fidelity which shall secure him a pleasant and regular attendance, he will, I think, decide in favor of some one not originally distinguished for large conventional acquirements, who was not prominent at graduation, but, beginning quietly, has grown and ripened with experience, — not the eminent and learned reader of medical books, acquainted with every theory of fever, who will analyze him for urea, register him with a sphygmograph, keep a thermometer in his armpit, and generate ozone in his apartment, — but a plainer sort of man, — one whose diagnosis is accurate, whose wide practical experience and sound judgment have taught him not to harass disease with uncertain or conventional remedies, whose active interference is cautious and discriminating, whose mummery is harmless beyond doubt, — in short, who never loses sight of general principles, — who stimulates, depletes, derives, or narcotizes, when he is sure the malady requires it, does neither when he is not sure, and scrutinizes with great caution the contradictory results of the favorite prescriptions of the medical host.

While abroad recently, I visited in consultation with a distinguished foreign practitioner an American child fatally affected with diphtheria, whom he was treating with continued small doses of copaiba, which produced an obviously prostrating, though unintended catharsis. His argument was, that the

child was like to die, that the friends required that something should be done, and that somebody had recently reported a number of cases all terminating favorably under this treatment. I said to myself, How much safer would this child have been in the hands of an average Massachusetts physician, who would have kept steadily in view the importance of economizing and supporting its strength! What this learned and distinguished medical philosopher lacked was judgment; in the practice of medicine, if we do not set the landmarks of judgment firmly, learning may displace them disastrously.

And incidentally, in this connection, let me say, that, in the medical examination of a student, I have considered sound judgment some offset to imperfect knowledge. The young practitioner may be safely trusted to consult his books before administering the active poisons of the Materia Medica. A little extemporaneous or "incompatible" ink or soda-water, at his hands, is innocent, when compared with a persistent and lifelong misinterpretation of symptoms, or their ill-judged medication.

We are speaking of practitioners, of the working men peremptorily demanded by the community everywhere, and whom medical schools are expected to furnish. In the education of these it should be the aim to develop good judgment by a reiteration of undisputed facts in their simplest expression, and by a constant reference of these facts to such broad principles as can be demonstrated beyond reasonable doubt. The teacher should keep constantly in mind

the use and application of the student's knowledge. He should never lose sight of the fact that everything in medical instruction is to be made wholly subservient to the prevention and proper treatment of disease. Indeed, and more precisely, Therapeutics is the single leading idea, to which no inconsiderable part of modern medical education is secondary, and even tertiary, if I may say so. To know the remedy, you must know disease, and this is Pathology; to know disease, you must know health, and this is Anatomy and General Physiology; and, lastly, if you seduce the ultimate particle away from its friends and its affinities, and cross-examine it, this is Chemistry in its widest range. But every step of this progression leads farther and farther from the original object of medical education, which is Therapeutics. It is all more or less desirable as knowledge, if you can have it all; but if you cannot, you must choose what is essential to the practitioner, and especially you must consider what he can hold: and the mass of medical students cannot, or do not, hold much at the end of three years' study.

I do not conceal from myself that it would be desirable to raise the average level of medical acquirement, skill, and capacity, the world over. There can be no doubt that a certain amount of incompetency, in our profession as in others, escapes through its graduating machinery, stamped with the tower-mark of the colleges. But we must not confound a want of opportunity with its neglect. The question is, Exactly what measures will best promote a better

education? You cannot turn out medical men with the uniform perfection of Ames shovels or Springfield muskets. The popular and specious cry for raising the standard of medical education comes often from those who know little of its difficulties, and it is notorious that those who clamor loudest accomplish least. The Vicar of Wakefield said he "was ever of opinion that the man who married and brought up a large family did more service than he who continued single and only talked of population." I am equally of opinion, that, in medical education, he who conscientiously seeks to enlighten his pupils, availing himself of the best means within his reach, does more to advance medical science than he who devotes his time to criticism and declamation upon the curriculum.

The last new medical journal, which calls on us to "lay down all jealousy, modesty, and reserve, and come boldly to the rescue, and by our united labors and best efforts seek to build up medical science in our midst, to the great elevation of the professional standard, as well as to the ultimate good of our community," and then, in a case of cerebro-spinal meningitis, proposes to administer, in the course of eighteen hours, "an ounce and a half of calomel, one ounce and a quarter of sulphate of quinine, and two ounces of bromide of potassium," suggests the character of much of the criticism put forth on this subject, both in public and private, and to which inexperienced persons are disposed to listen.

These remarks are not intended as a plea for mediocrity. It should be remembered that our present system of medical education, imperfect as it may be, produces men eminent in science, and furnishes able teachers as well as distinguished practitioners. Most eminent men are in a large degree self-made, and have pursued their subject from the attraction before them, and not from a stimulus behind. The material out of which philosophers are made is largely supplied from their own intrinsic and determined will. Genius is talent with a strong driving power, whether versatile in all directions, or more profitably guided by taste or circumstances in one direction. You cannot create this talent nor compel this taste. You may, indeed, give it opportunity, but you cannot force it.

Nor does scholarship, in its common acceptation, insure medical eminence. In the classes graduating from our universities, the more cultivated scholar, by reason of his talent or training and power of application, rather than his acquisition, is, indeed, apt to average well afterwards in the paths of literature and in the professions, but he by no means monopolizes the honors or the active work of life, especially in the medical profession. On the contrary, his brilliant career often terminates early, through no fault of his own, but because it has been mainly the work of others. He has studied Latin, Greek, and Mathematics, not for an ulterior object, but because they were prescribed; and when left to himself, stimulated neither from

within nor from without, he may become as ineffectual as a ship or a horse turned loose. Your medical school should not be arranged for his benefit alone.

But it may be urged: Perhaps the key-note of the student's mind has not been struck; perhaps Natural History or applied Science might have developed a capacity and a power of unbidden study to which Grammar and Geometry have in vain appealed. — There is much truth in this view, and much has been recently done in recognition of it, in the undergraduate department of our own University, always active in the vanguard of intelligence and light, — never more alive to the progress and the demands of the age, never more full of vitality, efficiency, and promise, than at this moment. Much has been effected by allowing to the student a latitude in the choice of his studies.

But something yet remains to be done. Few young men are competent to make their own unaided choice. Few medical students take up a subject — for example, Physiological or other Chemistry, the Microscope, or any of the less immediately applicable or more attractive branches — with the knowledge how to apportion it properly with reference to a sound and well-balanced medical education, or to what they will afterwards need as practitioners. It is here that supervision is especially requisite. And a wise guidance implies tact and patient discrimination, and aims at what in adult education, at any rate, is more important than mere

acquisition, — namely, acquisition for a definite and useful purpose. In encouraging motive, it develops principles of action and character, conduces to that enduring and strenuous effort in one direction, which makes the reputed college dunce, who has dragged through his collegiate course in the last half of his class, persistently wasting his time with gun, boat, base-ball, novels, poetry, anything but the prescribed studies, a useful, hard-working man, and in the affairs of life puts the boy who has been a persistent thorn in the side of his tutor far ahead of one whose deliberate standard of excellence has been the tutor's approbation instead of his own. The horse difficult to break makes the best horse. Backbone, unbending though it be, is better material to work upon than a compliant "mush of concession" to the last man or the last thing. In fine, a determined and intelligent purpose is the surest basis of all adult education. Opportunity comes next, and lastly organized system.

In these remarks we have been drifting toward the recognition of a fact always to be kept in view, that the period of the medical student's curriculum especially attended with varying and permanent results begins with his graduation, when he is set free and left mainly to himself.

Practically speaking, the medical student in this country then begins a course of study varying with the characteristics and habit of his mind, with his power of application, and with his opportunities. To one, a year or two of faithful labor in Vienna or

Berlin or Paris is an actual extension of his previous three years' term; to another, an equally laborious, though slower observation, an analysis combined with book study of cases occurring in his own practice, leads in the main to the same result: both or either conducing to an accumulation of knowledge of the highest order, and furnishing the more learned and able of our medical men.

The schools and colleges graduate every year a horde of young men, born to education, who settle away into insignificance, while the whole land is full of heroes who have fought their way to usefulness and eminence, to high positions in the state, in the professions, in the arts, and in trade, by sheer force of will and determination. To such you must give opportunity; and you fail in the administration of your trust, if you do not arrange every part of your machinery to facilitate their progress.

Of two classes educated to the same standard, in the same community, the larger will yield the greater product of wheat as well as chaff. No medical school in this country, however disinterested its professors, can afford on any ground to lose sight of the size of its classes, which are at once the seed and its fertilizer. If any school has not chosen to improve the quality of its teaching in proportion to the increase of students and pecuniary receipts, its example affords no argument against these remarks, which might be superfluous, had it not been speciously maintained to be absolutely better to turn out a few graduates educated to a certain standard

than a larger number not educated quite so well. The aim of any reform in medical education, in this country, should be to educate at least an equal number of students to a higher standard. If, in order to the better accomplishment of this object, some radical change in the present plan of medical teaching be demanded, great care is also required lest a new system should prove exclusive or impracticable to the many.

With these preliminary remarks, let us rapidly review some of the various topics of accepted medical study, in relation to a higher standard of medical competency.

Observation is a word in frequent use in connection with medical study. The secret of profitable observation is not only to observe accurately, but also to know precisely what to observe. When Nature is on the witness-stand, you may not ask her leading questions, yet you must ask her something. If you say to a student, "Here is a bone, observe it carefully," he may inspect it intently like a dog, and to as little profit; and if, like the brute, he is cut off from previous and transmitted learning, he will be likely in the end to add quite as little to the sum of knowledge. But if he considers it in relation to other bones, to its muscular mechanism, to its joints, or the manner of its formation, — if he compares, discriminates, and infers, all this is profitable observation. Intelligent observation, the work not only of the senses, but of the

mind, and for a purpose, is based upon previous knowledge.

In medicine, it is, indeed, important to study facts in the authenticity of actual occurrence, and to keep the mind free from words and book-learning as substitutes for these. Let the student rest upon experiment, and not on authority. Teach him to doubt, until he has collected his own evidence and made his own deductions,— but give his mind something to do, as well as his eyes. Show him exactly on what points you desire him to doubt, to experiment, and to infer. All profitable observation is to test theory, or, in other words, to settle doubt,— whether about the substance of a child's marble, the existence, form, or meaning of a protuberance on a bone, or the identity of terrestrial forces. It cannot be too strongly borne in mind that "observation" should have a very definite purpose and direction.

Again, the geometrician, wishing to make his proposition clear, states it distinctly before proceeding to prove it. The juggler, on the other hand, wishing to keep you from understanding what he does, never tells you beforehand what he is going to do. Let the student, therefore, begin with a clear understanding of what you are proposing to demonstrate. Show him the map, before you travel over the ground. Give him his concise abstract hypothesis, before you demonstrate it to his senses or his reason. Then let the demonstration follow quickly, the dissection upon the anatomy, the clinical teaching upon the so-called didactic teaching.

A perfect system of instruction would accomplish this, and in Anatomy you accomplish it by modern illustrated book-anatomy, to which the student may devote himself with far less reservation than to modern book-pathology. There is no excuse in these days for deficiency of anatomical knowledge. If a little of the enthusiasm which formerly found expression in the production of elaborate preparations of the arteries, and in gigantic hearts of many colors, now equally expresses itself in the attractive fields of chemical manipulation and the microscope, the change is not objectionable; it need not interfere with the acquisition of a branch, the increased modern facilities for whose study render a knowledge of it compulsory, and which underlies all the rest.

The gross anatomy of the viscera is of such transcendent practical value in relation to all disease, that every student should be able to make with perfected skill a common autopsy of the healthy subject, attesting familiar knowledge of the outlines, the interlocked masses, and the economical packing of these organs.

The anatomy, I will not say of the bones, but of certain bones, and of certain joints, is essential, not only to the welfare of the patient, but to the good of the practitioner himself, — as in saving him from action at law, often well grounded, for malpractice. Such details every practitioner should have at his fingers' ends, to the sacrifice, if necessary, of the multifidus spinæ, the cutaneous of Wrisberg, the chorda tympani, or the two legs of the diaphragm.

A student's Anatomy, for whose details a practical surgeon, a pathological anatomist, and I would even add a physiologist, should vouch by concurrent certificate, would stand at least upon a basis of utility.

The dissecting-room, a school for manual dexterity as real to the surgeon as to the carpenter, is not propitious to intellectual effort. It would be no injustice to the student rigorously to require from him an exact knowledge of the bones, and of the principal muscles, arteries, and veins, before dissection, if only as a preliminary exercise in accurate study and investigation. There is no danger that he will here lose sight of facts in words. Anatomy thus acquired, and in half the usual time, is retained immeasurably longer; and with a previous knowledge only waiting verification, frequently recurring opportunity invites local, practical study. On the other hand, the student who waits to be inspired by the impartial allotment of the demonstrator's hat will be very apt to abandon his negligently divided fifth, when he discovers for himself that Anatomy enters at the head with effort, and not at the hand without it. A solid groundwork of Anatomy, never acquired, if not acquired at the outset, is the most satisfactory investment of the beginner's time.

I once heard a member of this Society express a plausible satisfaction that his business lay in curing disease rather than in studying its anatomical changes. But where palpable change exists, one might as well ignore the mechanism of a damaged

watch as undervalue its importance; and the more accurate the knowledge, the better the diagnosis. At some time in the distant future, observing the bronzed patch, or the hyaline cast, like a compass, we may invoke a specific remedy for the renal or renal-capsular lesion which they indicate, as we turn the ship's wheel. But until that remote day when all diseases can be so identified and arrested, any appreciable change of material tissue must lie in the direct road to Therapeutics.

No single branch of education is more essential to the medical student than Pathological Anatomy, the corner-stone of medicine. And yet it will hardly be credited, that, while its study is a matter of only secondary importance in some of our colleges, chiefly perhaps for want of opportunity, a distinct professorship of that branch existed for many years in Harvard University alone. We here early saw the value of knowledge resting on a surer basis than pulse and pain and deranged digestion. Indeed, it is not too much to say that the comparatively exact standard of medical knowledge in this immediate community for the last thirty years has been largely due to the accurate and disinterested observer who has occupied the college chair of Pathological Anatomy for nearly a quarter of a century.

It is important to the practitioner, and especially to the surgeon, because it is so often practicable, to identify a morbid growth by its gross appearance, rather than by its aspect under the microscope.

I remember the heresy, years ago, of a laborious, sensible, and unostentatious country observer, who said that he had been able to find very little in morbid cell growth which he did not also find in healthy tissue. If any change has marked the character of investigation in this direction during the last ten years, it is a recognition of this fact, in the study of the arrangement of the particles rather than the particles themselves, of the section rather than the cell.

Let me, to illustrate my own convictions, transcend for a moment the limits of strict induction. I recognize two underlying formative forces in the machinery of the human fabric, — one which transforms the cell and raw material into the perfected tissue, and another which distributes and moulds that tissue to the outline and proportions of the human body. Without the latter force we have the amorphous fat, bone, or cartilage, glandular or uterine tissue, which are examples of the so called homologous and comparatively innocent growth or tumor; while without the former we have the untransformed cellular and other raw material of heterologous growth, whether malignant or benign. The innocence of a benign growth, connected with the fact that its peripheral cells do not interfere with their neighbors, points to their dependence upon some governing force inherent in the whole mass, and to which each cell is subordinated; while the principle of "malignity," by which a neighboring tissue or distant gland is pervaded

and supplanted by the new cell, equally points to an independent existence in these last. In my own mind the growth of an innocent tumor is associated with a centralized or monarchical government, and the independent tendencies of the cells of the cancer and its congeners with the self-ruling elements of a modern commune, by an analogy too close to be purely fanciful.

All this points to a distinction between similar growths, based upon lesion rather of their inappreciable forces than of any structure appreciable to the eye. And the same train of remark may be applied to the isolated cell, of which two, apparently similar, like seeds or eggs, may develop a widely different maturity: one cell benign, of a reproduction slow, though progressive, tolerant of its neighbors, and altogether unobjectionable as a citizen; the other fomenting evil, insidiously supplanting its neighbor, a fungus in the rapidity of its increase, deteriorating directly or indirectly the whole system, which it involves at last in a common ruin. And yet these cells may be positively undistinguishable. If Chemistry finds identity in its allotropism, Pathology equally finds diversity in its isomorphism.

Modern Science, after laborious examination of the wide range of growths which occupy the fields intermediate between innocence and malignity, has in general terms advanced the incredible statement, that "epithelial" cells aggregated in little chambers of interlacing meshes may be classed as cancer, with a tendency to recur widely, while growths composed

of cells juxtaposed without this chambered tissue have a tendency only to local reproduction; but as this rule is far from having a practical infallibility, modern Science hedges, in avowing that a competent observer may devote two or three days to the examination of a small growth, and yet fail to discover some minute portion of exceptional tissue, which at a subsequent time may dominate the mass and overrule its previous tendencies.

To the practical surgeon, to whom rules with such exceptions have little value, the great question with regard to these morbid growths is the possibility or probability of their recurrence. The philosopher's-stone of the histologist is a distinction between innocence and malignity, divested of which ignis-fatuus, Science may seem to the explorer to have lost a part of its charm. But this question the experienced surgeon or pathologist will settle with great certainty, with a little occasional assistance from the microscope, far short of the refinements of modern Science. Such is the lesson to be kept before the mind of the student, — the clinical utility of pathological histology.

No subsequent experience or observation can, indeed, ever call in doubt a microscopic appearance once correctly observed and recorded. But its classification according to presumed affinities is as changeable and uncertain as groups in clouds or the kaleidoscope. The large labor absolutely necessary to keep pace with modern, and especially German Science, in this direction, has a value to the student, in

directing his close attention to the material of disease; but he may readily devote to these attractive studies a disproportionate amount of time, and, above all, lose sight of the relation of his labor to its result. Although the observation of diseased tissue conventionally involves the philosopher in theories of its relations and significance which the lapse of every ten years seems to subvert and replace with a new crop, it is difficult to persuade the student of morbid growths under the microscope that the present year does not represent the culmination of a perfect science, and that the last new doctrine does not embody the final and enduring truth.

Another consideration, in reference to this subject, is the fallacious connection between names and things. A growth, for example, whose clinical history, whose tendency, and whose microscopic structure were thoroughly understood ten or fifteen years ago, under the arbitrary name of "fibro-plastic," and then of "recurrent fibroid," now appears in the new rôle of "fasciculated sarcoma," with little added to our practical knowledge of it; and the same is true of "necrosis" and "osteo-myelitis": yet the student who is laboriously admitted to the new name believes he has discovered a new thing, and that his previous knowledge is allied to a conservatism past which the current of Science is rapidly sweeping.

In Pathology the student has reached the kernel of his subject. He may well gaze with admiration at the magnificent array of valuable facts, both

medical and surgical, old and new, here spread before him as the basis and solid foundation of his future practice and his future progress, — striking, when compared with those of former years, for the absence of any induction which does not follow close upon the record. Here lies the gist and body of the student's three years' work. With the invaluable material thus now collected for strictly medical study, in such works as those of Niemeyer, Aitken, Holmes, or Billroth, there is no danger that he will devote a disproportionate period to that accurate investigation which alone makes it possible to treat disease intelligently, and which implies a successive study of one disease or small group of diseases at a time. Specialty in practice unfortunately tends to encourage hyper-practice and ignorant practice, — prolonged, useless, damaging, — in which the practitioner may deceive himself, perhaps his patient. It narrows therapeutic view, substitutes local for general measures, and dwindles to ever-changing instruments and methods. Not so with special study in Pathology, which, if of facts, and not of theory, and proportioned to the student's time, is better according as it is more accurate and elaborate.

The medical Preraphaelites of the old so-called numerical system, whose proselytes did not hesitate to pay a large price in time and labor for its angular results, were in error only so far as they prized this dry and exact method as an end of medical study, rather than a stage of accurate investigation. In reality, Preraphaelite efforts are valuable chiefly as

marking progress, leading to equally accurate, but far more comprehensive generalization. Such laborious study and mathematical exactness were essential to the subsequent excellence of the highest art. Without it you may have the tolerable drawing, the harmony of color, and the occasional good composition of modern pictures, but nowhere the combined perfection of all these qualities which distinguished the great masters of a former age, in whatever school. You cannot have the great generalizations of painting, history, or natural history, of science ethical or material, of medical science, whether in theory or in practice, without a previous accurate knowledge of detail. And this is to be acquired while the student is a student. Laborious and careful study must precede what looks like careless handling, but which is really a masterly and free perfection.

With a generalization of detail, with a selection in each particular case of what is essential and a simultaneous rejection of what is not so, with sweeping and comprehensive rapidity, a master of his art will give you a mere silhouette of diagnosis and treatment, with a single broad light and shadow, every part proportioned to the rest, which may be far more accurate and more to the purpose than the labored, conscientious work of a less skilled man. But, in the seeming inspiration of a moment, the master has given you the concentrated and digested skill of a life of careful study and practice.

And, to pursue the simile, if the advanced practitioner, who has arrived at his second and broader

therapeutic manner, should come gradually to believe that the treatment of an old doctor is better for the patient than the diagnosis of Young Philosophy, he may be pardoned for forgetting that he would stand on a yet broader basis, if he were master of every modern truth of Pathological Anatomy and Pathology.

The student's work is mainly with facts of empirical association. Proximate cause in medicine leads to treacherous ground, which, unless mechanics or pure chemistry, it behooves both student and teacher to scrutinize with doubt and hesitation.

The proximate relation of symptoms and disease to contagion, infection, and miasm; what smells and dirt are unhealthy, — considerations upon which depend important sanitary measures; whether albuminuria is due to an original change in the blood; the relation of urea to convulsions; the proximate cause of pyæmic symptoms: such are questions concerning which no certain proof has been adduced, which are as likely to be settled ten years hence in one way as another, and are therefore to be held before the student with reservation.

But remoter and empirical cause may be profitable study. The assemblage of human beings as a cause of disease, the probable correlative equivalence or significance of the wide range of dissimilar symptoms differently affecting the sexes, and which pathologists have at times grouped as hysteric or mimotic, are examples in point, leading to broad therapeutic views and away from harmful local interference.

Some jaundiced person might aver, that, when an affection is curable, it is taken from the physician and handed over to the surgeon, the ophthalmologist, the dermatologist, or other specialist, and that the former, bewildered by the intractable assemblage of signs, symptoms, and overgrown viscera remaining to him, and driven to desperate expedients, is compelled to drug the patient and his friends in self-defence. But we cannot set too high a value on modern Therapeutics in its best form, — that science of the alleviation, and occasionally of the arrest of disease, which is the ultimate aim of our art.

A materialism here productive of error is that which leads to the belief that we can so far understand the physiological action of a drug, that we can rely, for example, upon three grains of hydriodate of potash to produce a certain three grains' worth of effect, not upon the ultimate condition of the patient, which it is well known we can sometimes do, but upon his intermediate machinery. Phosphorus, it is said, supplies brain substance; but literature is probably better fertilized with roast beef and Sherry wine than with fish. We can better judge of the effect of aloes, juniper, or tea on the intestines, kidney, or brain of the next man by knowing how it affected the last man than by any reasoning upon the metamorphosis of vital chemistry. The student who expects to influence disease because he understands how a drug passes through the visceral cells will get into a habit of therapeutic reasoning and action very likely to damage the man or woman

who owns the viscus. For him, the established rules of art are safer teaching than the speculations of science.

On the other hand, we are not on this account to lose sight of general therapeutic principles, when they can be clearly established. Students incline to lean upon prescriptions. But, except upon the conquered ground of syphilis and intermittent, of pain and similar instances of well-recognized effect, I believe that a practitioner would do better with broad therapeutic views than with all the prescriptions of the best medical writers.

The skilful surgeon, who startled his pupils by daubing an ulcer with ink from his pen, treated his patient not slightingly, nor with indignity, but with a simple application of sulphate of iron, of tannin, and of a principle.

New drugs find their greatest consumption in small communities, where the standard of Therapeutics, disturbed by medical journals, is not at once righted by the inertia of medical opinion, and where the practitioner is therefore more liable than elsewhere to lose sight of general laws in the routine of practice.

In no pursuit of life is the judgment more distinctly called upon than here; and we should learn this to our cost, did not the power of Nature stand up against the lesser expedients of so-called medication. The action of the medical attendant is so constantly based upon imperfect indications,—he so often finds it difficult to decide between a general and local

treatment, — the question is so often, "How much and how long?"— so often whether to treat the body or the mind of the patient, or the convictions of his friends, — whether to do something or to do nothing, and, if nothing, how to do it with harmless form and circumstance, — he so frequently invokes his science hopelessly,—his science is so overcast by error inculcated with the authority of learning and the experience of former time, — indeed, his best modern authorities are so often fallacious, that it is no wonder the best judgment should frequently be at fault.

To what conclusion, then, may fallacious judgment lead? Would that it were possible, after providing ample teaching in the magnificent array of undisputed facts of modern Pathology, to add to it sound instruction in the comparatively limited field of the best modern Therapeutics, and then to endow, as more important than any other office of tuition in the healing art, a professorship of Common Sense, — of which, indeed, all science has been said to be only the highly organized result.

What shall we say of the Materia Medica, that wonderful armory of therapeutic warfare, catalogued in the dispensary, emblazoned for exhibition by the apothecary: the obsolete weapons of the savage, harmless or envenomed; the clumsy artifices of the Middle Ages; the Chinese armor, specious to the eye; the stink-pot, potent to the sense, side by side, without invidious preference, with the improved ex-

pedients of later art; for the modern expectant, the wooden guns to fortify delay, while the more active practitioner reflects with satisfaction upon his trusty breech-loader?

"Favorite Medical Prescriptions," blowing hot and cold at the same time, at the same disease, — shooting promiscuously at friends and enemies, with general good intentions, like friendly regiments meeting in the dark, — what is such a book, but the panacea, on a large scale, of that good physician who accumulated the residuum of his bottles in a common receptacle for use in difficult cases?

What precocious wisdom in the letter written (the lines ruled above and below in pencil) by the young Prince to the Duke, his tutor! "My Lord," says he, "I would not have you take too much physic, for it doth always make me worse, and I think will do the like with you. I ride every day. I am ready to follow any other directions from you. Make haste to return to him that loves you."

The judicious Sir Henry Holland somewhere ventures to doubt whether a single prescription, containing an ingredient for each symptom of a complicated disease, against which it is especially levelled, may not perhaps sometimes fail of producing its whole intended effect. I should boldly aver that it may.

And yet there is a clinging reverence and love for the memories, the associations, the superstitions connected with these mysterious agencies, so largely identified with the health of the human family, and the pockets of the medical profession.

In an address before a learned medical society, to which I have the honor to belong, a distinguished friend of mine once stated, that, if all the medicines in the world were thrown into the sea, it would be better for the world and worse for the fishes. Unfortunately, we all thought he said *physicians*, and very properly rose in a body to hurl back the startling insinuation. He was happily saved from universal execration by remembrance of his stanch and lifelong devotion to all that is honorable and true in our profession and in the world.

The matter of prescribing, in every-day practice, stands thus: First, does the disease, on any ground, require a prescription? Second, does the patient? If the former, let the prescription convey with the word the blow; but if you prescribe for the patient, and not for the disease, the prescription, then an empty word, a *vox*, if need be, should convey also a *præterea nihil* of undoubted innocence. Materially embodied in a bottle or a bath-tub, as an epithem, a measure, a restriction, the *præterea nihil* is not unfrequently the weights-and-scales of convalescence. Whole theories have been built upon its supposed action. The essence of some of the most successful species of charlatanism, the emergency for its employment in a visible form occurs at every turn; and the teacher should see to it that it does no mischief, either to the patient, or to the science of the practitioner.

Opium, narcotism, anæsthesia, consciousness benumbed, the nerves quieted, — what can the phy-

sician do without a therapeutic principle to which half his long prescriptions owe their chief, if not their only efficacy? And yet it seems but yesterday that I was called upon to justify the newly discovered anæsthesia in a common defence with the lightning-rod and the umbrella. In a surgical practice of twenty-five years, I have never intentionally given a patient, unless by his own choice, any unnarcotized pain, nor have I allowed a patient to die a death of pain, when opium would lull him into his long sleep. I share the responsibility of this with the surgeon who walked about the battle-field distributing morphine to those who were hopelessly wounded, and with the soldier of Ambroise Paré, who did more. It has been said, that to cut the nerve of a lame horse's leg is like cutting telegraph-wires to stop a war; but it does more, in preventing the wear-and-tear of pain upon vitality. It has been my lot to see a friend, at the end of a painful and hopeless malady, to whom, when the hour of death seemed to be near at hand, I had given morphine largely, twice awaken with a week's new life, due to eighteen or twenty-four hours' deep sleep and continued exemption from pain. Short of engendering a habit, it is better for the patient's strength and life to sleep with opium than to lie awake with pain for the want of it; and I do not apologize for remarks, trite though they be, which are no digression from the subject of the education of one the great business of whose life is to relieve pain and suffering, whose sheet-anchor, whether in life or at

the hour of death, is narcotism in some degree or form, and without which his profession, if not his prescriptions, would be comparatively a farce.

A full-blooded Latin prescription, the unabridged edition, such as we find in English books, is perhaps the curious single relic, clinging to our art, of its early history. And yet it is important that the student should acquire so much of Latin, or, at any rate, of the principles of that language, as shall enable him readily to understand the general character and construction of the Latin names of his therapeutic materials.

Latin is the accepted language, the world over, of much of the nomenclature of medical science. *Maranta* in Boston is *Maranta* in Paris and in Calcutta; and so with the products of Chemistry. Years ago I read a learned and protracted controversy upon the therapeutic properties of the cow-parsnip, terminating in the important avowal that the controversialists praised each a different cow-parsnip, whose rival claims to commendation added fuel to the dispute, but presented insurmountable obstacles to its conclusion. If the world are agreed upon a single name for a drug of any sort, let us adopt it; and the world seem to be agreed upon the Latin name. But it is a separate question, whether a teaspoonful should, of necessity, be a *cochleare*, or even whether a name once indicated should be susceptible of the terminations of declension. Business is but business. The merchant's price-current does

not say "*of* Cochineal," "*of* Jute." However incongruous to the classic sense, and although the innovation might for a time console and encourage conventional ignorance, I would agree that the mystic ℞ be accepted as only a signal to the apothecary that a prescription is to follow, — and that such Latin and English names as are unmistakable should be promiscuously intermingled as vernacular, without regard to case, as if the whole were Anglicized, — and especially that subsequent directions should be expressed in English.

Chemistry and Physiological Chemistry, like Anatomy, or like Surgery to the purely medical man, though not daily weapons in the combat with disease, are yet an essential part of a liberal medical education. Although we may not look to the chemical philosopher who has invested a large intellectual capital in this collateral branch of study, nor yet to the zealous advocate of the expansion of all human knowledge, for an impartial estimate of what may be profitable to the three years' medical student, we must avow that no intelligent modern practising physician can afford to be ignorant of the great principles which underlie this science. He cannot be expected to manufacture Epsom salts, any more than the modern disciple of Izaak Walton can be expected, as formerly, to make his own rod; yet he must know their capabilities. The practical chemistry of the physician will probably be confined to a simple routine of the microscope and test-

tube, and to breeding harmony and peace in long prescriptions; yet it may be fairly expected from the average student of the present day, that he shall know something of waste and supply, of assimilation and excretion, something of the analyzed products of disease, and, more than this, that he shall himself be able to conduct a simple investigation for their detection.

But it is useless to the medical student to know that every four grains of urea excreted correspond to five tons lifted through one foot; and I believe, further, that, as surely as the manufacture of steel is one thing and the repairing of watches another, so Chemistry and Physiological Chemistry will every day be more and more recognized as a distinct branch of study, and the results which they furnish to medical science, in the shape of rules and signs to identify disease and remedies to arrest it, as another distinct line of study, each separated from the other by the limited capacity of the human mind, which can grasp a part, but not the whole, of human knowledge, by the limit of life, which is short, and by the indefinite expansion of either of these branches of study, which is sufficient for the best powers of the average man for the whole of his best years.

It is the business of Chemistry to supply facts and resultant rules and methods, just as much as to supply the chemical tests upon the shelves, — in details, in packages, with directions for use, — that labor here, as elsewhere, may be subdivided with the progress of art.

It should be borne in mind, that, strictly speaking, a practitioner has no more need of knowing the origin and mode of preparation of opium or Dover's powder than of chloral or the oxalate of cerium. Sir Astley Cooper and Sir Benjamin Brodie needed no more detailed knowledge about their remedies than Sir Joshua Reynolds and Turner about their colors. The color-manufacturer and chemist should supply them, and tell their properties. It is no derogation to our science to avow, that, when Physics or Chemistry is invoked in aid of a fractured limb, or an acid stomach, or of diabetic food, it is done, not in virtue of a recondite study of those abstract sciences by the physician, but rather in virtue of a routine application of details long familiar to the exclusive chemist or mechanic.

And so of Experimental Physiology, which leads away from broad and safer therapeutic views, and toward a local and exclusive action of chemistry and cells,— uncertain ground for students, for whom the result of large and well-attested medical experience is here the safest teaching, and a habit of mind leading to experiments on patients the most questionable.

Mercury, as a prominent specific, and opium, may, perhaps, be viewed as entering wedges of discovery in therapeutic science, so far as it is more probable that they act chemically upon material particles than upon anything so immaterial as vitality. The history of the cryptogam and the parasite, of skin-disease, the grape, the potato, the smut of wheat,

and the silk-worm, also points to the hypothesis of a material cause of disease, of a derangement of the machinery this side of the impalpable or even of the invisible,—to chemical combinations of remedy with disease, resulting in harmless products replacing noxious ones, or, in the case of germ-life, to combinations fatal to it. But we may carry the theory of tangible or visible machinery too far. When the philosopher avers, that, because the air is full of dust, therefore some floating germ probably causes cholera and scarlatina, yellow fever, plague, or cerebro-spinal meningitis, it should be remembered, that, although we conventionally return to dust, we do not spring from dust alone. Dust does not make monstrosities, or cancer, or tumors; nor is inflammation dust. It remains to be shown whether miasm and infection are often more palpable than are hereditary gout or constipation in the spermatozoön which transmits them. We know nothing of vital force. Chemistry may, indeed, create a quasi-protoplasm, but it gives little assurance that it can do more in this direction. The Pygmalion of modern Chemistry may with infinite skill form his statue, but the proved facts of modern Science promise little to his prayer that it may live. The mason may construct a house, but there is little hope that it will ever be animated by an added vitality even of spontaneous generation, or by life begotten in other than the usual way.

The attractive field of Physiological Chemistry leads through speculations like these, until it reaches

a point of wild and fanciful hypothesis which twenty-five years since would have startled the sober disciple of rigid induction. The reaction of the present day is from induction to theory. As the soil throws out alternate crops, each springing from the material which the last has left behind, as the religion of the masses in the lapse of years alternates between apathy and excitement, so does the scientific world, tied down for a long period to the monotonous lead of indisputable fact, seek that liberty of the imagination whose attractiveness even Bacon well knew and recognized. Such theory has undisputed value. The hypothesis of minds like those of Faraday and Huxley may represent a value to science hardly to be overestimated. But with the student of medicine, whose time is limited, the question must ever be one of its economical distribution. To the utilitarian, disparagingly asking, "What is such hypothesis good for?" Tyndall replies, with Dr. Johnson, "What is the use of babies?" I venture to answer, "To make men in twenty-one years." Light that will become fruit in twenty-one years has just that value, and no more; and hence its pursuit may be a thriftless investment of the medical student's time.

In this country the question is, What is the most profitable investment of time, capital, and labor? — and the teacher of the art of healing has no more right to employ the time of the ignorant student disproportionately in the pleasant and seductive paths of laboratory experimentation, because some of these may one day lead to Pathology or Therapeutics, than

a guardian has to invest the money of his ward in stocks or securities of equally uncertain prospective value to him.

How few facts of immediate considerable value to our race have of late years been extorted from the dreadful sufferings of dumb animals, the cold-blooded cruelties now more and more practised under the authority of Science!

The horrors of VIVISECTION have supplanted the solemnity, the thrilling fascination, of the old unetherized operation upon the human sufferer. Their recorded phenomena, stored away by the physiological inquisitor on dusty shelves, are mostly of as little present value to man as the knowledge of a new comet or of a Tungstate of Zirconium: perhaps to be confuted the next year; perhaps to remain as fixed truth of immediate value,—contemptible, compared with the price paid for it in agony and torture.

For every inch cut by one of these experimenters in the quivering tissues of the helpless dog or rabbit or Guinea-pig let him insert a lancet one eighth of an inch into his own skin, and for every inch more he cuts let him advance the lancet another eighth of an inch, and whenever he seizes with ragged forceps a nerve or spinal marrow, the seat of all that is concentrated and exquisite in agony, or literally tears out nerves by their roots, let him cut only one eighth of an inch further, and he may have some faint suggestion of the atrocity

he is perpetrating, when the Guinea-pig shrieks, the poor dog yells, the noble horse groans and strains, — the heartless vivisector perhaps resenting the struggle which annoys him.

My heart sickens as I recall the spectacle at Alfort, in former times, of a wretched horse, one of many hundreds, broken with age, and disease resulting from lifelong and honest devotion to man's service, bound upon the floor, his skin scored with a knife like a gridiron, his eyes and ears cut out, his teeth pulled, his arteries laid bare, his nerves exposed and pinched and severed, his hoofs pared to the quick, and every conceivable and fiendish torture inflicted upon him, while he groaned and gasped, his life carefully preserved under this continued and hellish torment, from early morning until afternoon, for the purpose, as was avowed, of familiarizing the pupil with the motions of the animal. This was surgical vivisection on a little larger scale, and transcends but little the scenes in a physiological laboratory. I have heard it said that "somebody must do this." I say it is needless. Nobody should do it. Watch the students at a vivisection. It is the blood and suffering, not the science, that rivets their breathless attention. If hospital service makes young students less tender of suffering, vivisection deadens their humanity and begets indifference to it.

In experiments upon the nervous system of the living animal, whose sensibility must be kept alive, not benumbed by the blessed influence of anæsthesia, a prodigal waste of suffering results from the

difficulty of assigning to each experiment its precise and proximate effect. The rumpled feathers of a pigeon deprived of his cerebellum may indicate not so much a specific action of the cerebellum on the skin as the more probable fact that the poor bird feels sick. The rotatory phenomena, once considered so curious a result of the removal of a cerebral lobe, were afterwards suspected to proceed from the struggles of the victim with his remaining undamaged and unpalsied side. Who can say whether the Guinea-pig, the pinching of whose carefully sensitized neck throws him into convulsions, attains this blessed momentary respite of insensibility by an unexplained special machinery of the nervous currents, or a sensibility too exquisitely acute for animal endurance? Better that I or my friend should die than protract existence through accumulated years of torture upon animals whose exquisite suffering we cannot fail to infer, even though they may have neither voice nor feature to express it.

If a skilfully constructed hypothesis could be elaborated up to the point of experimental test by the most accomplished and successful philosopher, and if then a single experiment, though cruel, would forever settle it, we might reluctantly admit that it was justified. But the instincts of our common humanity indignantly remonstrate against the testing of clumsy or unimportant hypotheses by prodigal experimentation, or making the torture of animals an exhibition to enlarge a medical school, or for the entertainment of students, not one in fifty of whom can turn it to

any profitable account. The limit of such physiological experiment, in its utmost latitude, should be to establish truth in the hands of a skilful experimenter with the greatest economy of suffering, and not to demonstrate it to ignorant classes and encourage them to repeat it.

The reaction which follows every excess will in time bear indignantly upon this. Until then, it is dreadful to think how many poor animals will be subjected to excruciating agony, as one medical college after another becomes penetrated with the idea that vivisection is a part of modern teaching, and that, to hold way with other institutions, they, too, must have their vivisector, their mutilated dogs, their Guinea-pigs, their rabbits, their chamber of torture and of horrors to advertise as a laboratory.

The direct and efficient medication open to the surgeon contrasts strongly with that upon which the physician leans, and which is grounded on the uncertain indications furnished by pulse and tongue, temperature and digestion. His therapeutic *armamentarium* compares still more strikingly with the limited remedial resources of medical art.

The practitioner recognized as a surgeon, because he professes a knowledge of surgical lesion and disease, or because he has popularly identified himself with the far inferior province of Operative Surgery, can indeed do little, compared with the great recuperative force of vitality in its silent and never ceasing work among the atoms, establishing the cell out-

posts of a new territory, and collecting and manufacturing the raw material into the completed tissue, until the work of repair is perfect. Compared with this, it is poor skill which cuts off a tumor or a leg, lays a fractured limb straight, replaces the fragments of a broken joint, — or that fails to do so. Yet nowhere has medical art conquered so large a domain as in surgery, nowhere is progress so rapid, and nowhere is the importance of principles so forcibly presented to the student. Such principles lead back to precise rules. Thus, if a common ulcer, in default of local cause, is treated according to its condition, by stimulant or soothing measures, here are principles; and if the student is acquainted with measures, he at once commands all the resources of his art. Without these principles, he perhaps applies a "wash," with the simple faith which leads him to rub mercurial ointment on every induration. Such views hold generally true of surgery, which deals largely with mechanics and surface-work, and therefore admits of much precise knowledge, susceptible of a generalization of highest value to the student.

In this connection, and as still allotted to the surgeon, we should not forget the magnificent and practical studies, fresh with the imprint of modern discovery, Inflammation and Repair, where the vital principle, stimulated by emergency, exhibits at the will of the observer so rapid and comprehensive a panorama of the processes of healthy nutrition.

Much abused as it is, I sometimes think that a wholesome fear of the law of the land is not a bad

stimulus to well-doing in surgery. The medical man becomes so accustomed to standing by, with the solemn conventionalism, the routine and implements and parade of art, and so accustomed to the familiar fact that medical disease pursues its unabated and independent course in spite of what he does, or so sure, at any rate, that nobody, not even he himself, will know the difference, that he gets insensibly to feel, that, if he does the best he can in surgery, nobody will know the difference in surgical result. But everybody professes an opinion on a distorted limb. Many medical lesions can wait until the practitioner, like a lawyer, refreshes his knowledge; but broken thighs and elbows, wrists and ankles, will not wait, and every physician should know how to treat what is so liable to bad treatment.

Lastly, I believe that much of Medical Jurisprudence, so called, a subject which treats of the legal relations of medicine and of the medical man, is probably better allotted, in instruction, to the special department which it touches, as I am sure so much of it as relates to surgery is, — and that the qualities of a good witness, sometimes discussed in lectures upon this subject, are, like those of a poet, rather congenital than to be acquired.

In thus briefly glancing at the education of the practitioner, let us not overlook the wants of another class, who, from natural capacity, or power of

application, or from preliminary opportunities and training, can avail themselves of the advantages of a larger education, — who desire to leave the level plain of practical study, and climb the neighboring and lofty heights of Science, upon whose rills it depends for its fertility. In these days, an aspiration toward something more or higher than routine, a desire to transmit to Science, even in a humble way, some return for what Science has bestowed, a wish to breathe awhile in the clear atmosphere of the sciences which contribute to the progress of medicine, are fortunately common. It need not be said that a medical school should, if it can, meet this generous demand for learning with large and ample opportunities; in doing so, however, it should not lose sight of its legitimate purpose, the education of medical practitioners, nor lure the medical student away from essential study, still less exact, by examination, from the future practitioner, in favor of the scientist, a disproportionate amount of less applicable knowledge, — propositions upon which I strenuously insist.

Here I may call your attention to the fact that the student of the collateral medical sciences is not always the first in the field of great medical discovery.

It is a generous and pardonable sentiment which would claim for high and abstract Science a large share in discoveries of great immediate utility. But medical discovery is generally not made by workers

in chemical and physiological fields, but by subsequent and more purely medical observers, who apply to disease the materials and results of such previous work. Abstract Science crawls with snail's pace and amœboid reach, letting in here and there a little light, gathering up everything new, true, or probable, whether immediately applicable or for the time useless, so far as any obvious application of it goes: thus slowly filling storehouses with goods of every kind, from priceless gems to worthless rubbish. The practical man goes there to seek something for his purpose, and takes from the shelves the electric apparatus for his telegraph, lunar caustic for his photograph, ether for anæsthesia, the sugar tests and the food for diabetes. We justly honor the patient and learned worker in the remote and exact sciences, but should not for that reason encourage the medical student to while away his time in the labyrinths of Chemistry and Physiology, when he ought to be learning the difference between hernia and hydrocele. Let him go to the storehouse, and get his clothes, his coals, and his remedies, without being compelled to study tailoring, or Geology, or the manufacture of quinine.

If there is a sure advance in the slow siege-approaches of the scientist, a sure progress by the pick and shovel for succeeding generations, there is also another progress growing out of this, which results from the *coup* of impetuous force, or the strategy of genius. An able writer has said that "the most original and important inventions the world

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has ever seen were the productions of men who had received little or no previous training in the particular art they have sought to improve." A large part of that successful therapeutics which is the ultimatum of medical science results from such original and not profound experiment. A member of this Society, having, a quarter of a century ago, vainly treated a case of virulent eczema, considered what, as likely to do it least good, had been carefully shunned by previous practitioners, and applied to the excoriated surface an active stimulant, which not only cured it, but has since proved a scientific remedy of modern progress.

We owe the compass, the printing-press, the telegraph, vaccination, and anæsthesia — light-houses and fortresses of human happiness, safety, and knowledge — indirectly to abstract Science, and directly to practical working men. Art is the scientific application of the more accurate and positive part of human knowledge. It is this which the student of medical science needs, call it by what name you please. "One of the enormous follies of the enormously foolish education of England," says Sydney Smith, in a familiar passage, "is, that all young men, dukes, fox-hunters, and merchants, are educated as if they were to keep a school or serve a curacy." With equal force it may be said that it is not necessary to educate the family practitioners of town or country as if they were to serve in laboratories, and make analyses of biliverdin or uroerythrine.

The great object of modern education is to ascertain what the student wants, and to supply it exactly to his mind in the surest and shortest way. If, therefore, he asks to be taught fishes, do not teach him stones; if he desires a good English education, do not compel him first to learn Latin and Greek; if he wants to identify fevers and fractures, do not engross his time with cell theories and hydrocarbons.

The medical student does not need to pick herbs from the field, or treat horses and dogs, or consider his parallelogram of forces before pulling in a dislocated shoulder; but he does need to know how to recognize and exactly how to reduce a dislocated shoulder, how to recognize and treat human disease, and what are the medical properties of the drug which the farmer has grown or the merchant imported for the apothecary. This is but a fair division of labor. He has enough to occupy him profitably and exclusively in his own immediate field of study, without wandering over the whole domain of knowledge, — at least at the mistaken behest of those who have a confused notion of a liberal education and large culture, and whose chief motive for sending the unfortunate student to explore new territory seems to be that they have themselves invested capital there.

If we may fairly assume, on the one hand, that few undergraduates need to calculate the curves of a turbine wheel, we may equally affirm that the mechanism of the steam-engine, and of a hundred other engines, as of that magnificent creation of American intellect, the three-ply carpet loom, for

years in large and profitable use at Lawrence, and yet so complicated that the Englishman has never been able to introduce and run it, — that study of this sort would afford a profitable field for the exercise of the higher faculties of analysis and combination. Yet the undergraduate of my day, who was seduced by the name Mechanics into cheerfully beginning an octavo which he fondly hoped treated of pumps and pulleys, which he could understand, found at the end of half a dozen pages that each part of a pump or pulley was replaced by a letter or a numeral, and that the next three months of his life were to be engrossed in juggling these signs and symbols, like cups-and-balls, or bobbins on a cushion, as numerators and denominators, above lines and below lines, on one side of an equation or on the other side, with no single idea attached to them, at least of anything that is on the earth or in the water, — until, at the end of three breathless and harassing months, the symbols were again converted, to his great relief, into familiar pumps and pulleys, although with no new or distinct idea added. This was Science, not Art, — and Mathematics, not Mechanics. Mathematics deal with abstract quantity: our art deals with material. Like chess-playing, the mathematical faculty is not the highest or most profitable quality of inventive mind, in mechanical or other arts, or even in life; yet the conviction of this day and community inclines a little to the view that a medical practitioner who is fitting a presbyopic friend with spectacles, without

at the same time explaining to him that $\frac{1}{a} = \frac{1}{p} - \frac{1}{r}$ does not quite rise to the emergency. And this criticism involves neither disrespect nor ingratitude to any philosopher whose exclusive learning has so prepared the inorganic elements of our science that they can be readily assimilated and digested by the student of our art, and made available, whether for medical practice or medical discovery.

There is a fallacy in the idea of culture. A man accomplished in one direction is not necessarily educated in another. High æsthetic culture did not prevent the distinguished French painter and his friends from superintending the destruction of the Column of the Place Vendôme. The humanizing influences of refined beauty in Art neither taught them to restrain their personal and political hate, nor

"with sweet science mollified their stubborn hearts."

Talent and power of application may, indeed, incidentally lead a man to eminence in several directions. But a cultivated, a literary, or even a scientific man is not necessarily the best physician: the best physicians, indeed, are sometimes possessed of little outside culture. The same is true of other pursuits. The obvious inference is, that the most valuable knowledge is that which is most applicable to the purpose in view.

The great and immediate cause of Prussian success in the late contest with France was proficiency in the science and art of War. That the Prussian govern-

ment had better material to work with, that the whole body of the people was educated up to a level which enabled them to learn more readily and completely the business of the soldier, and generated, if you please, a higher sense of military duty, was of course so much the better for them. But this was a question of preliminary and early education. We may rely upon it, that, when war came, the highly educated and intelligent Prussian officers set their soldiers, whoever they were, and whatever they knew, to reviewing, not politics, nor philosophy, nor yet reading and writing, but organization, discipline, and drill. This had been a part of every man's education, and this explains their success.

Even in an atmosphere and country which encourage intellectual growth and expansion, the average condition of society is advanced only so far as each individual advances his province and department of it. Therefore, if he is to learn "a little of everything," let us be sure that he learns "a great deal of something," — of that which is to him most important.

In these days of arms of precision, if we elevate the aim and increase the range, whether in gunnery or education, we are compelled to adjust the sight more accurately to the object. Let us have liberal education in its widest sense, the highest education possible to the whole mind and the whole body of the largest number everywhere, — but then let us begin at the beginning and teach the child, and not at the end; and when the medical

student comes to you with three scant years which you cannot extend, and preliminary acquirements which you cannot then increase, — small capital enough for the study of human disease in all its modern interpretation, — do not send him wool-gathering among the abstract and collateral sciences.

Mathematics, Physics, Botany, Comparative Anatomy, Physiology, Chemistry, as subjects of study, are all secondary to those essential and limited parts of each of these collateral sciences, whether principles or details, which have been actually applied to medical diagnosis and therapeutics, — secondary, in short, to the study of medical science, and especially of medical art.

In giving this utterance to what a friend of mine was once pleased to denounce as scientific blasphemy, in assigning a limit to the present utility of certain branches of science in medical education, I do not propose a barrier to the progress of human knowledge, but insist that less applicable science should not be confounded with medical art, what the student may or may not need with what he must have.

Let me advert to a drier, but not less important subject: I mean the machinery of teaching. We shall presently see that the European, especially the German University, administered and directed by the Government, has in consequence great advantage in exercising a monopoly of medical teaching, and in

thus compelling the student to support and encourage a single and best system. I need not say that such an arrangement is impossible in this country, where State governments grant medical charters without stint, to all forms of professed medical faith. However desirable in theory a central guiding power in medical education, in this republican country we have neither got nor can we have one.

There exists, no doubt, an eagerness to assume and exercise such power. The American Medical Association, for example, passed, only a year ago, the following vote: —

"*Resolved*, That the American Medical Association has the power to control the subject of Medical Education in the United States, and the power to exercise that control in any manner upon which it may be agreed." *

I have even heard it alleged, that, if a body sends delegates to the American Medical Association, who subscribe to its code of ethics, the delegating body is considered bound by that code. This groundless assumption is the only claim which the American Medical Association, so called, possesses to authority over the medical societies or the medical schools.

The Massachusetts Medical Society is a corporation with no power except that which it derives from its charter, and under this charter it must act as other corporations do, by the votes of its members at legal meetings, and of its officers within the scope of their authority. It cannot delegate to another corporation, or to a voluntary association,

* Trans. Am. Med. Assoc, 1870, Vol. XXI. p. 35.

the power to make its by-laws, or to prescribe rules for its action. If its members choose to obey the rules of any other association or corporation, it is their individual act, and not the act of the Massachusetts Medical Society; and no such action on their part can bind it, until it is ratified by the Society. The same remarks are especially true of the medical schools.

The American Medical Association is a body of medical gentlemen, practically volunteer delegates, having primarily in view the agreeable and commendable object of a journey to break the monotony of medical practice and give them an apology for leaving their homes and their patients at a pleasant season of the year. They assemble to revive old friendships, to form new acquaintances, to make excursions, and to settle down into relations of good fellowship, after a healthy difference of opinion over current medical topics and parliamentary forms. There are among them members who take an active and intelligent interest in the cause of medical science, its progress, and its teaching; but they can exercise little influence except in suggesting what may seem to them desirable.

We must not be startled, if so extemporaneous an assemblage, while united in the semblance of parliamentary organization, and before they have settled down into that harmonious and neighborly cordiality which is their ultimate object, should pronounce immature opinions, claim for themselves authority, and hastily denounce friends, or even issue bulls of ex-

communication of as portentous form and as little significance as the tail of a comet, which may overcast the whole country with its shadow, but which astronomers assure us may be carried in a man's hat. It is not surprising that they should virtually say to you, a State society, empowered by your Legislature merely to exact from each member a certain quantity and quality of knowledge, that, if you do not transcend your legal authority and inquire into any other knowledge he may possess, in a way not only unauthorized by the law of the State, but which its lawgivers would forbid, then they, the Association, will neither let you eat their dinners, join their harbor-excursions, nor participate in their discussions, — nor will they allow you to use the platform and the name of the Association to ventilate your private or political differences.

This Society, the medical schools, and the medical community can well afford to attach little importance to such of the doings of the American Medical Association as seem skilfully designed, under the specious pretext of setting things right, to set men wrong. A body of so uncertain temper and impulsive action obviously has no authority to express even public medical opinion.

The number of medical schools in this country being practically unlimited, each school is liable to be successfully underbid, whether in fees or educational standard, by its neighbors, so long as a chief object of the large majority of students is the medical degree which confers authority to practise.

Most American medical colleges are virtually close corporations, which, under a Board of Trustees, in whom the power is legally vested, are really administered by their professors, who receive the students' fees, and upon whose tact and ability the success of these institutions wholly depends.

A University possesses over all its departments a legal jurisdiction; but it may be a question of expediency how far this shall be enforced.

The general supervision of a medical college by a University has, indeed, certain advantages. It may insure activity in the teaching, and, if exercised with constant reference to the possibility of thereby inducing change for the better, be thus an antidote to excessive conservatism.

Such wise direction from outside may perhaps advantageously share equally, but no further, the duty of seeking candidates for the offices, and of sifting their qualifications, — and while it thus assists them to enter the school, may influence them also to leave it, should their teaching prove notoriously inadequate. It may stand between the school and the community, especially the medical community, in satisfying them of the impartial character of appointments, the conscientious labor of incumbents, and their devotion to the best interests of education. It may satisfy the public that the questions of the day, having a direct relation to the best methods of teaching, have received careful attention, — in short, that the first object of the school is the welfare of the students and the elevation of

true medical science, and not the emolument, direct or professional, of the instructors.

But medical teaching should not be too much interfered with, nor its machinery hampered by those who are not familiar with its working.

A large part of medical teaching — perhaps, on the whole, the most important part — is the clinical instruction of hospitals, which it is quite plain can never be, in this country, as in Germany, in any way within the jurisdiction of a University. Again, a University, apart from its medical teachers, can know little or nothing of the complicated lines of division between medical subjects, or of their relative importance, upon which depends the establishment of professorships and other offices.

But another consideration lies deeper. A University cannot judge accurately of medical men, in a community where solid scientific eminence and mere notoriety in practice are largely confounded. While in France and Germany, as we shall presently see, the scientific merits of candidates for the higher places are publicly sifted and proclaimed, no such system prevails or can find place here; and while abroad it is well understood that in medicine the most popular teaching may not be the most profitable to the student, in this country professional distinction is often of uncertain character, and you may readily mistake in the teacher eloquence or any other attractive quality or accomplishment for science. If you add that in this country medical teaching is generally esteemed, not,

as in Germany, in itself an end, but a means, a road to the medical practice which is here the ultimatum of every medical man, you subject your University authorities to outside pressure for place and preferment, which they may be equally unqualified to judge of and unable or disinclined to resist.

The policy of enlarging a faculty by an indiscriminate addition of professors might grow out of an erroneous belief that you can teach medical facts from books by acceptable tutors, as you can Greek or Physics. The reverse is notoriously true. The teacher of the higher medical branches must filter, digest, and recast book facts, to a degree that implies large actual experience and sound judgment.

For these reasons alone, while formal appointments may be better left to the University, I am satisfied that nominations, as in Germany, should be formally, at any rate practically, delegated to a faculty of medical men. And the same is true of the establishment of professorships, and of the general organization of the school.

In medical matters, a University should rely largely upon the guidance and wisdom of those to whom it does not scruple to intrust its teaching. It may well hesitate to ignore their advice, and assume more than a general supervision over machinery which has a complicated relation to the medical community, and especially to the rest of medical teaching throughout the country, of which but a small part is connected with Universities, — a machinery which, to insure success, must be largely

an anomaly in its relations, its rules, and its offices, when compared with other departments of a University.

If a University desires to secure the services of medical men of competence or eminence, most of whom, in this country, unlike teachers of undergraduates, are engaged in active business, it will maturely weigh the question, how it may compensate them,—whether by professorial position, which, if you make it common and cheap, ceases to be desirable, — by intrusting them with discretion and authority, which, if you reduce them to the rank-and-file of tutors, and rule them by a non-medical and comparatively uninstructed interference, they no longer possess, — or by money, which in the higher branches of medical teaching, and in default of other inducements, must be considerable in amount.

German medical science, until fifty years ago infused with German mysticism, with *a priori* speculation concerning remote affinities, inaugurated about that time a different philosophy, substituting for theory and vain discussion rigorous deduction from ascertained facts, — the method, in short, so long before vindicated by Lord Bacon. Soemmerring and Meckel in Anatomy, and Burdach and others in Physiology, were now laying the foundation of a school of exact observation in medical science. About this period, also, Laennec was a prominent pioneer of an equally exact school in France, des-

tined to eclipse for a time, by the labors of men with whose names this community are familiar, the slower, but solid, progress of the German school. But the superiority then and for years afterward so obvious in French medical science, and to whose valuable teaching the German school owes much, has gradually yielded to the rapid strides of more recent German progress. The learned and distinguished Johann Müller, the father of Exact Physiology, soon followed by Schwann, Henle, Liebig, Rokitanski, Valentin, and Weber, and later by a host of others, of world-wide reputation, inculcated both by teaching and practice the value of accurate experiment, to the exclusion of unproved theory, — a line of study rigorously prosecuted for the last quarter of a century.

The barren fields of speculative hypothesis and arbitrary assertion have thus been fairly replaced by the precise results of induction from observed phenomena; and when we consider the multitude of able minds and the vast labor thus for years concentrated upon the facts of health and disease, we shall be astonished neither at the amount nor the character of the progress of medical science in Germany during this period, nor at the advantages which the German schools offer at this moment to the medical student.

It may be of interest at this point to allude briefly to the so-called materialistic tendencies which are supposed to have grown out of these

investigations, and which would have less importance, were it not for the prominence which the narrower theologians have given to them by active opposition. It could hardly be supposed that the German mind, with its well-known tendency to theorize, would rest completely satisfied with the slow deductions authorized by facts. But, curiously enough, the theorizing tendency, which before constructed its hypotheses with little or no foundation, now uses the facts of modern science as a basis for similar hypotheses. Instead of arguing, for example, upon the relation of life to imaginary conditions of oscillation or tension, it has propounded questions equally impossible of solution upon the recognized facts of Physiology and Chemistry. Thus, it being clear that organized bodies have some properties and modes of action — life, for example — by which they differ from inorganic bodies, we naturally ask whether life is a principle superadded to the material. The philosopher replies: No, it is not necessary that a quality which we find in a body should be added to it, and be distinct from it: for example, the extension and weight of a body are intrinsic to it and inseparable from it; we cannot conceive of such qualities apart from the body itself: and so it is with those elementary qualities of organized bodies whose aggregation constitutes life: in short, life is identified with an organized body, just as are its size and weight. The gist of this argument, that vitality has no existence separate from matter, is, that vitality separated from mat-

ter has never been observed by human sense: it is a quality of matter, because we cannot put our finger upon it after it is separated from matter. The advocate of this doctrine leaves no ground for inference, and admits the existence of nothing which has not been observed by his senses. The tendency of this doctrine is obvious. It leads to the conviction that what we cannot observe apart from matter does not exist, — that there is no weight or dimension separate from matter, no vitality apart from organized material, no thought apart from the brain cell.

Such is Materialism, the bugbear of theologians. Moleschott, in 1857, says: "By the very fact of life, plants and animals return to their source. All is resolved into ammonia, carbonic acid, water, and salts. A bottle containing carbonate of ammonia, chloride of potassium, and phosphate of soda, with lime and magnesia, with iron, sulphuric acid, and silex: here is the defunct vital spark of plants and animals." *

Such is the position with which Huxley has so stirred the theologians. Because protoplasm, which he assumes to be the lowest form or basis of organized life, is resolvable into ammonia, etc., and because life has never been observed by our senses apart from protoplasm, therefore life is not something added to protoplasm, but merely a quality of it, whose existence ceases with it. We have here only time to

* The Circulation of Life: Physiological Answers to Liebig's Letters on Chemistry, by Jacob Moleschott, 3d Edition, Mayence, 1857, p. 276.

answer, that, although we may observe no life without its protoplasm, yet we may kill the protoplasm, and thus separate it from life, while we cannot separate matter from extension or weight.

It will be readily seen that all this leads through a show of chemicals to the old question of religious faith. Without a belief in what cannot be strictly proved, we can have no religion. Religious faith, like all other faith, is a belief, more or less strong, not only in the unproved, but in what may not be susceptible of logical proof. The practical point, in this relation, which alone can lead to any profitable result, is the question, where rigorous proof shall end and religious faith begin; and this question admits of profitable difference of opinion. Beginning with mechanical force, and ascending to muscular agency and to the other signs of physical vitality, to sense, and through the intellectual machinery controlled by the will to the will itself, the individual, the Ego, and so upward to higher Power, it may well be a question of speculation and difference of opinion, at what point of this ascending scale human investigation and discovery will ultimately stop. You can now breed and hybridize both plants and animals. Perhaps some philosopher, with a better understanding of the proximate machinery of life, may hereafter animate matter by some new method. But the vitality of the body is not the whole being. That some of the seemingly inscrutable machinery of what we call life may be within the limit of our comprehension, as the result

of future rigorous observation and deduction, is not impossible. But it is absurd to suppose that the Ego, the individual, can ever comprehend itself. At some point short of this, investigation must stop; and it is, then, for the philosopher to determine whether he will reject a belief in the existence of everything which lies beyond, or accept something on faith, — which in this case is belief, more or less strong, in a hypothesis of cause working outside the material system, based on and derived from all we have seen, experienced, and inferred of constant and seemingly necessary precedence of force, or whatever one may choose to call it, within that system. It seems to me better and more consistent logic to accept and to act on this uncertain knowledge than to reject it, especially in view of the fact that most of our unhesitating and daily action is based on equally uncertain knowledge.

Such are the aspects and tendencies of Materialism at the present day, about which medical men are popularly supposed to have an opinion. But, in the mean time, the student of medical science has his hands full of work with Pathology and kindred studies, and, as a rule, knows little and thinks less of these speculations.

Let us now briefly review the medical department of the German University, — the undisputed head of medical teaching at the present day, whether we regard its quality or quantity; for although much of this may be impossible to us, there may

be also something that will point us in the direction of an improved system of teaching in this country.

The parental care of the German Government for institutions of learning is such, that the number of medical schools is limited only by their clinical and anatomical possibilities, being before the present war not far from twenty, while the number of teachers is enormous.

Nominating their own officers, enjoying a certain power of action independent of Government, and not unfrequently without Government subsidy, these schools contain three classes of teachers, — the regular or so-called *ordinary professors*, who alone are members of the faculty, the *extraordinary professors*, and the *private teachers*, — the last two classes comprising the teachers of specialties.

Any vacancy in the corps of *ordinary professors* is publicly advertised; applications are wholly unrestricted; and from the applicants one, two, or three are selected by the faculty for nomination, — practically an appointment, inasmuch as the first on the list receives the formal appointment then made by the King: an impartial system, which, by insuring the place to the best man, excites an active emulation among the professors of the lesser universities for promotion to the larger and more important centres of instruction. With ability thus guarantied, the professor holds his place for life, but may retire on full pay at the end of thirty years of service, — this pay being about a thousand dollars from the Government, an amount

sometimes increased to three or four thousand dollars by students' fees, both to professors for private courses and to the faculty. While the professor is thus secure of a minimum, he is at once stimulated to excellence in his own teaching and interested in the success of the whole faculty, — considerations neither of which should be lost sight of in the organization of a school.

Of the ordinary professors, the more important, perhaps, are the clinical professors, who range over all medical subjects in two separate and parallel courses of lectures, devoting one to what we call didactic, and the other to clinical teaching, never confounding the two. Chemistry and Physics being part of the preliminary course, there are no professors of these branches within the faculty.

The place of the ordinary professor is no sinecure. He sometimes devotes from ten to fifteen hours a week to teaching. Virchow announces about eighteen hours a week with the students, some of these, however, being delegated to an assistant, — and the Professor of Anatomy more. Moreover, in order that the student may be sure of a complete course of instruction, the faculty have the right to call on any professor for lectures outside of his immediate branch, it being understood, that, the more lectures he gives, the larger will be his receipts : a rule steadily enforced, and the more easily because it is understood that the two clinical professors alone, out of the whole faculty, are engaged in the practice of medicine or surgery.

In order to prevent an otherwise necessary increase of the faculty proper, there is an indefinite number of additional and so-called *extraordinary professors*, not members of the faculty, nominated by this body from among the private teachers, appointed by the Minister of Instruction, holding their places for life, and, unless their subject is very unattractive, dependent for fees wholly on their classes. These extraordinary professors often give parallel courses upon the same specialty: a competitive method, obviously contributing to good instruction.

In the larger Universities the number of professors constituting the faculty proper, and of the extraordinary professors teaching specialties, is about a dozen each: the former comprehending professors (in some cases two) of Anatomy, Physiology, Pathology, Morbid Anatomy, Materia Medica, Obstetrics and Diseases of Women, Clinical Surgery, Clinical Medicine, and Medical Jurisprudence; while the extraordinary professors, teachers of permanent specialties, may be designated in general terms as those of Histology, the Skin, the Eye, Dentistry, Syphilis, Diseases of Children, Surgical Apparatus and Bandages, Comparative Anatomy, Special Medicine and Surgery, Mental Diseases, and Veterinary Diseases.

Private teachers are appointed by the faculty to give instruction upon any subject within the range of medical science, with the sole restriction that they may not give gratuitous courses upon any subject on which a professor gives lectures not gratu-

itous: a provision which seems to imply that it is well to nourish professorial teaching with money. They lecture in the halls of the University, their instruction being official, and published as such in the official catalogue. Their number is unlimited, being at Vienna about thirty, at Berlin twenty, and a dozen at Breslau, where the students number respectively about a thousand, four hundred, and one hundred and fifty.

With this machinery the medical faculty receives from the Government a guarantied monopoly of medical teaching, while, on the other hand, the public and the medical student have an equal guaranty of the completeness of instruction practically unlimited in extent, and whose excellence is insured by the competitive emulation of its teachers.

At the outset of the German student's career we are impressed by the character of the qualifications necessary for admission to medical study, which, indeed, do not differ materially in degree, though perhaps in kind, from those required for admission to the undergraduate department in our Universities, yet are higher, I regret to say, than those which a large majority of our medical students could meet. But it is not the preliminary knowledge required by the German University that we in this country miss, so much as the resultant culture and mental training, the capacity for study: in this we are compelled to acknowledge that the American medical student has large room for improvement.

The year is divided into two terms, together oc-

cupying about ten months, and the time devoted to medical study is nowhere less than four years, and in the larger faculties five years, — the result of which, with the previous mental training, added to extended opportunities for the acquisition of modern medical science under the best instructors, we cannot afford to overlook. It will hardly be credited that there are at Berlin, in each week, three hundred and forty-one hours of medical instruction, and at Vienna three hundred and seventeen, — although the student may be required to attend lectures amounting in the average to twenty or thirty hours only, a week.

With the single restriction that the study of Clinical Medicine and Surgery, and Midwifery, cannot be entered upon until the completion of the more elementary branches, and receiving merely general advice from the faculty, the student is left to himself to choose among the various opportunities for instruction, being, as a rule, required to devote the first half of his four or five years to the elementary and theoretical studies, notwithstanding a common desire to attend the hospitals; and certificates of actual attendance upon these branches are rigorously exacted. The teacher is supposed to acquire, to some extent, a personal knowledge of each student; and the student, in turn, is at liberty to select his teachers in the parallel courses, which for the first ten days are gratuitous, to facilitate his choice. This liberty of choice is also extended to the different Universities, so that a student may

pass from one distinguished professor to another, ultimately complying with the formalities of examination in that University only at which he graduates. But it should be remembered that these examinations are an actual and rigorous test of the student's knowledge.

Medical teaching rests largely on clinical opportunity. The collective hospital at Vienna is immense, and it might be anticipated that a part only of this, and even of hospitals in smaller cities, would be profitably available for medical instruction. The Government wisely interferes and provides for this emergency, by allowing a clinical professor to select from the whole hospital establishment cases suited to the purposes of instruction, and also to remove from his wards such as are no longer profitable or interesting to the students, who have thus the very great advantage afforded by an unlimited number of selected cases.

All hospital autopsies are made by the school professor of Pathological Anatomy, who selects cases as in the wards. These autopsies are made independently of the clinical professor who has had charge of the cases; and while the latter, in treating the disease, has been expected to lecture upon it in detail, and to furnish to the students a carefully recorded diagnosis, the pathological professor makes before the class an equally detailed demonstration of the autopsy, also accurately recorded, impartially verifying or disproving the views of the clinical

professor. The student further follows the case, if he desires, from the autopsy to the microscope room.

In short, the hospital patient, from first to last, subserves the requirements of the student to an extent impossible in this country.

Physiology, Physiological Chemistry, and Vivisection are taught in appropriate apartments and laboratories.

No one can fail to be struck with the eminently practical character of the medical examinations, and with the fact that they are calculated to determine indisputably the degree of proficiency in the various branches of medical study. The student is tested by the professors, in presence of the patient, in the autopsy room, in the laboratories, in short, in every useful way, by examinations. These examinations take place at irregular periods of the course, and we are not surprised to find that a large number of students are turned back at different stages of their progress. And if the protracted term of study — four or five years, at the least, as already stated — detains the student long under the eye of the professor, and so tends to educate him rather as a follower than an independent leader, it should be remembered that its machinery is arranged to encourage him at every step to try his own powers of flight, and practise him in the exercise of his own judgment.

In a word, — a medical school virtually appointed and carried on by medical men, — a teaching based mainly upon large clinical opportunity and an abundant and accurate demonstration of medical facts, — life and activity grounded upon emulation, — a system guarantying to the soundest teacher the widest reputation and the largest classes, with an unrestricted freedom of competition, especially in the outset, and holding out as its final prize a permanent tenure of its highest offices with an adequate remuneration, — such are the elements of the great success of modern German medical education, with its underlying principle of practical instruction in all branches that admit of practical demonstration.

He who comes home, fresh from German opportunities, and, impressed with their obvious advantages, attempts to incorporate the German into the accepted American system, will find that this luxuriant growth of another hemisphere is not wholly adapted to our soil or to our requirements. He must supplant public opinion by a central government supreme in all matters pertaining to education and hospital administration, replace the American with the German professor, and the American student with the German student.

In Germany, the Government enforces a system which distributes a number of salaried places, conferring high distinction, impartially to the best men; and in thus offering large pecuniary prizes to scien-

tific merit, in a country where the mass of the people are poor, makes Science itself a field of active emulation which has no ulterior professional aim. This cannot be expected here.

To the foreigner, the especial attraction of Vienna — as of Paris formerly — is, that the student who desires instruction upon any one of twenty or twice twenty different, yet distinctly medical or surgical subjects, of every-day use to the practitioner, can, with half a dozen of his friends, induce an able teacher, for a moderate compensation, and with every facility for clinical or anatomical illustration at command, to exhaust the subject for their particular benefit. The knowledge is exactly what you want, imparted when you want it, and by a teacher with whom you are brought into close personal relations. But it is an error to confound the idea of this medical knowledge proper with any vague notion of a higher education and a higher science to result from extended collateral study. Let us distinctly bear in mind that the American medical student abroad commonly has little to do with either Physiology or even Chemistry, unless he pursues it as a special branch of study, and for some purpose other than the practice of medicine.

Paris, once the Mecca of the medical student, has yielded to the predominance of the German, in science, as in arms, partly through the original indirect influence of the common school, — because, while France means Paris only, Northern Germany, in

the words of Colonel Stoffel, is "covered with centres of intellectual activity and production, so that, to enumerate them all, one has to go down to towns of the third and fourth rank," the average intellectual level being everywhere higher. But I think we must avow, that, apart from mere education, there is something in the original character of the German people, a solid and unattractively plain folk, which stamps it as different from the genius of the French or the American people. It has been called a sense of duty; but it seems to me to be rather an instinct of labor without personal ambition. To quote Colonel Stoffel again: "One never ceases to be astonished by it, no matter how much one studies the Prussian people. The most remarkable illustration of this is furnished by the employés of all grades in the different branches of the administration of the monarchy. They are paid with surprising parsimony, they are generally burdened with families, and yet they toil all day long with indefatigable zeal, without complaining, and without appearing to desire an easier position. 'We take good care not to meddle with it,' said M. Bismarck to me one day; 'this laborious and badly paid bureaucracy does the best part of our work, and constitutes one of our principal forces.'" What is this but instinctive labor, the patient routine of the bee, rather than the expanding aspiration generated by American soil? — and I intend no "spread-eagleism" in this remark.

Until that distant period when the whole face of

our country shall be changed, until this great continent is so crowded with struggling life, and so hopelessly oppressed with the superposed strata of political and conventional form, that no individual can upheave the social sediment and lift himself into the active world, but by sheer habit and the force of circumstances shall continue in the last half of his life to investigate the simple cell that occupied his younger years, there will be few world-distinguished scientists, in limited, special spheres, here, as in Europe. The mass of human knowledge grows, indeed; but many years must elapse before we can expect such growth in this country, before scientists will look to an American city, as to the Vienna, the Berlin, or even the Paris of Medical Science. And in the mean time our country needs well-qualified medical practitioners.

The considerations which have been offered with regard to the capacity, the wants, and the time of the medical student, and also with regard to the tendencies of modern medical science and instruction, present a wide field for serious reflection. American medical education should guaranty to the student of average preliminary training and acquirement, who has honestly devoted three years to medical study, a knowledge at once adequate to the immediate practice of his profession, and a germ of future growth in the right direction,—knowledge unmistakably medical, practical, comprehensive, and rooted in the soil of modern science.

In this vigorous country, where the pursuits of business exhibit so many striking examples of early capacity, and where the aim of every young man is to find himself in active life, it is plainly difficult to fetter the ambition of the student with a view to insuring greater conventional and average competency. American medical colleges, too, are engaged in active competition to secure the largest classes. If public opinion has prevented the better institutions from reducing their standard of attainment much below a point concerning which there has been a tacit understanding, it is safe to say that no successful school has thought proper to risk large existing classes and large receipts in attempting a more thorough education. Steps in this direction have been guided rather by a desire to attract larger classes, — and perhaps by a conviction, that, while we must accept a certain amount of inferiority, the standard of medical education in this country may be raised, in the future as in the past, gradually and with certainty, by making the best opportunities available to the largest number.

Whatever opinion be entertained of this policy, it will be conceded that it differs from one which absolutely exacts from the medical student more knowledge, and resolutely refuses a degree (too often perhaps regarded as mere authority to open day-book and ledger) until he shall comply with the increased requisitions, — requisitions not of a mere formal and technical character, but a guaranty of increased practical skill in every branch of the medical art.

Such is the object of measures recently inaugurated in the Medical School of Harvard University, upon which the Massachusetts Medical Society now mainly relies for the education of Massachusetts students, — measures adopted by its professors in a spirit of personal sacrifice, with a full sense of the possibilities they may entail of increased labor and diminished pecuniary receipts, and of which I feel it incumbent on me here to say that whatever credit attaches to them is due to my colleagues, and to the President of the University.

By the newly adopted plan,* the term of study still being three years, no student can receive a

* It may be stated, for the information of those not familiar with medical education in this country, that the student, before he can be examined for the degree, must have studied medicine three years, and also have attended two courses of lectures in a medical college authorized by law to confer degrees.

The present usual or winter course of lectures lasts four or five months. Its advantages are, that it saves money to the student, to whom city board during a long consecutive period is often impossible, and who on that account is frequently obliged to content himself with one course of lectures in a city school, — and that it also economizes the time of the instructor, usually a practising physician, to whom it may be desirable to concentrate his teaching into a part of the year.

The disadvantages of this system relate chiefly to its necessary condensation, which begets a want of completeness in its teaching, — defects, however, which in our own University have been largely compensated by its summer term or school, which has furnished to the student who could afford it a supplementary and comparatively thorough instruction. This school, the first I believe in this country officially identified with a medical college, was also one of the most complete in its organization.

Harvard University has, indeed, long offered to the medical student great advantages; and it was no deficiency in its teaching, compared with that of any other college in this country, that suggested a change in its plan of medical instruction.

degree from this school who has not been connected with it at least one year. A progressive system of study of three years' duration, beginning with the elementary, and ending with the higher and more exclusively medical branches, including, as a matter not of form, but of reality, all the intermediate subjects of medical study, offers to the student, who can devote three years to it, what must be considered, in this country at least, a very complete medical education. It involves, as will be seen, the necessity, in part, of three concurrent courses of instruction during each year. The student who joins this school for two years, or even for one year, may, if he pleases, by closer application to study, avail himself of these three courses simultaneously, with the obvious advantage of expanding the former winter course into a year or two years of progressive study during his one or two years in the school.

A part of a year in the Harvard Medical School, or a part of a year in any other school, will count in either case only as time, and not as a "course of lectures," — a measure inuring to the benefit of other colleges, in sending to them any student who desires that two "winter courses" of four months each should entitle him, as now, to examination for a degree in the college at which he takes one of those courses. On the other hand, Harvard College will so examine any student, who, having complied with all other usual requirements, shall have taken at least one full year's course of study in its own

school, — a measure which, whatever else may be said of it, insures to the student a higher standard of acquirement than has been yet exacted in this country, in view of two facts: first, the progressive teaching attained by abandoning the winter course; second, its requirement of competency in all the nine departments of study, — a competency, however, which is more easily attainable, because it may be practically and finally tested in any one or more branches, at the option of the student, at any one of three annual examinations, failing in which, he may try again, when he likes, in those branches alone.

I heartily join with my associates in hoping that these carefully considered measures will accomplish the special purpose for which they have been adopted, that of raising the standard of medical education in this country.

I betray no confidence in saying that some of my able colleagues would have been glad to insist upon at least a two years' residence here. My own conviction has been that we are clearly not justified in doing anything seriously to endanger the present large success of the institution we have hitherto administered. In the recent words of one of the great reformers of the day: "If we attempt to go too far ahead of the community, we may be left too far behind. He ventured to think that a system which would gain the attention and respect of the people must be one not too rudely divorced from their old system. He wanted to see the adoption,

by the Board, of regulations, not in accordance with what he might think right or otherwise, but capable of moving in the direction in which thought was moving": * I would add, in the direction of that enlightened public opinion which in this country is the legitimate directing power in education, and which, as I interpret it, would open to the medical student a most liberal scientific opportunity, and insist upon a competency strictly medical.

* From remarks of Professor Huxley on the Bible in London Schools: *Boston Daily Advertiser*, March 29, 1871.

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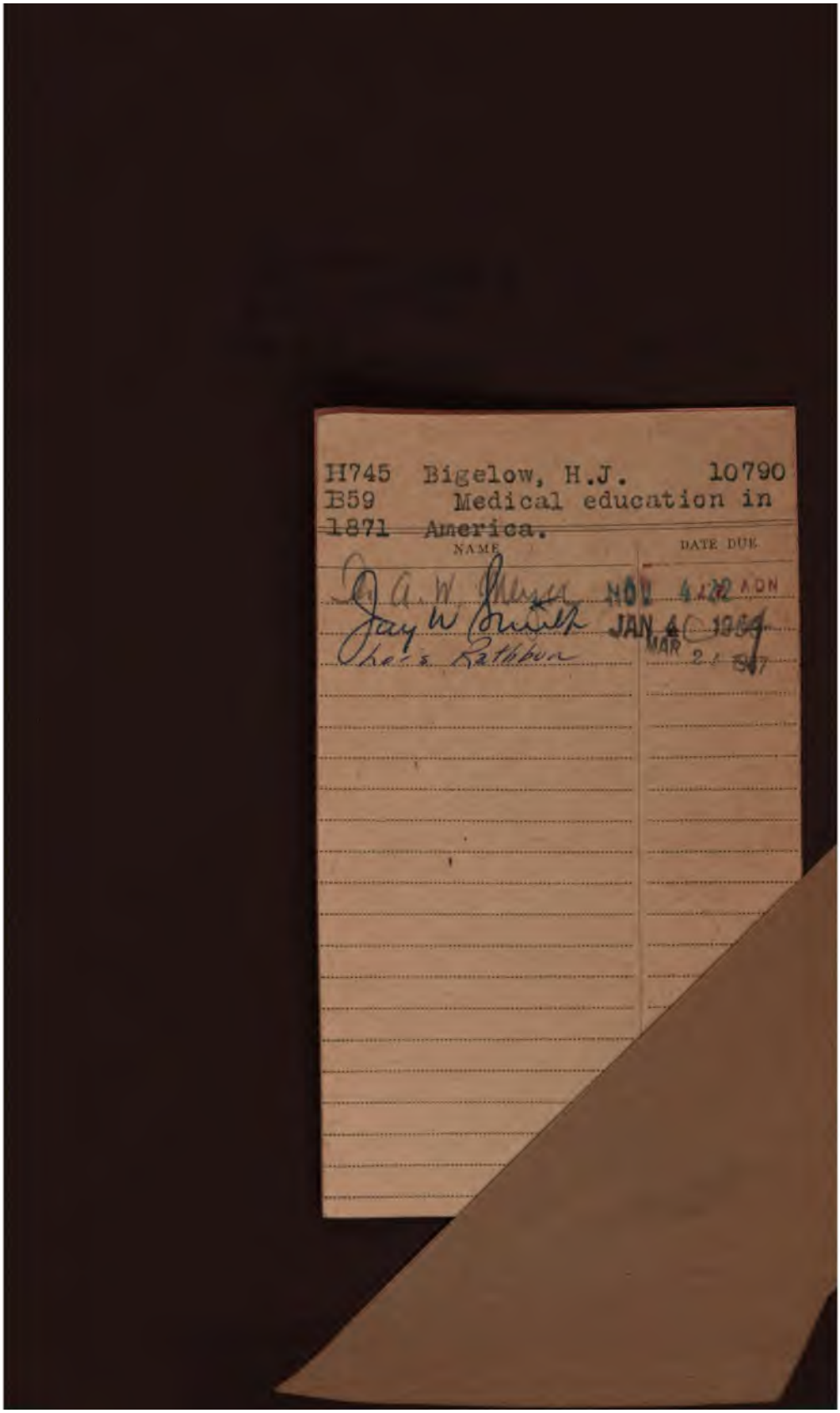
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